

## CLAIMS

What is claimed is:

1. An optoelectronic assembly for an electronic system comprising:

a support electronic chip set configured for at least one of providing multiplexing, demultiplexing, coding, decoding and optoelectronic transducer driving and receive functions;

a first substrate having a first surface and an opposite second surface, said first surface in communication with the support electronic chip set;

a second substrate in communication with said second surface of said first substrate, said second substrate configured for mounting at least one of data processing, data switching and data storage chips;

an optoelectronic transducer in signal communication with the support electronic chip set; and

an optical fiber array aligned at a first end with said optoelectronic transducer and at a second end with an optical signaling medium;

wherein an electrical signal from the support electronic chip set is communicated to the optoelectronic transducer via an electrical signaling medium, and

wherein the support electronic chip set and the optoelectronic transducer share a common thermal path for cooling.

2. The assembly of Claim 1, further comprising:

a Si carrier having a first and second surface, the first surface configured to flushly mount the support electronic chip set and the optoelectronic transducer therewith, said Si carrier configured to provide unimpeded heat flow to said second surface opposite said first surface.

3. The assembly of Claim 1, wherein:

the second substrate comprises a multi-chip module, a dual-chip module, a single-chip module, or any combination thereof; and

the first substrate is an organic or a ceramic substrate containing electrical interconnects.

4. The assembly of Claim 1, wherein:

the electrical signaling medium is a wirebond between the support electronic chip set and the optoelectronic transducer.

5. The assembly of Claim 1, wherein:

the first substrate includes a shelf or recess configured in the first surface to receive the optical fiber array therein in optical communication with the optoelectronic transducer.

6. The assembly of Claim 1, wherein the optical signaling medium includes an optical fiber cable bundle and a connector having at least one optical fiber incorporated therewith for communication with another optoelectronic assembly or the second substrate.

7. The assembly of Claim 1, wherein the fiber array is bonded to the Si carrier in communication with the optoelectronic transducer, the optical signaling medium is bonded to the fiber array.

8. The assembly of Claim 7, wherein the fiber array in communication with the optoelectronic transducer is via a mirror disposed at an angled surface at one end of the fiber array.

9. The assembly of Claim 1, wherein the electrical connection between the first and second substrate uses micro solder balls with a pitch of less than or equal to 500 microns.

10. The assembly of Claim 2, further comprising a second optoelectronic transducer flushly mounted with the first surface of the Si carrier, the first and second optoelectronic transducers being each configured to transmit and receive optical signals, respectively.

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11. An optoelectronic assembly for an electronic system comprising:

a support electronic chip set configured for at least one of providing multiplexing, demultiplexing, coding, decoding and optoelectronic transducer driving and receive functions;

a Si carrier having a first and second surface, the first surface configured to flushly mount the optoelectronic transducer;

a first substrate having a first surface and an opposite second surface, said first surface in combination with the Si carrier providing electrical communication with and between the support electronic chip set and an optoelectronic transducer in signal communication with the support electronic chip set, and;

a second substrate in communication with said second surface of said first substrate, said second substrate configured for directly mounting at least one of data processing, data switching and data storage chips; and

an optical fiber array aligned at a first end with said optoelectronic transducer and at a second end with an optical signaling medium.

12. The assembly of claim 11, further comprising:

a Si carrier having a first and second surface, the first surface configured to flushly mount the support electronic chip set and the optoelectronic transducer therewith, said Si carrier configured to provide unimpeded heat flow to said second surface opposite said first surface.

13. The assembly of Claim 11, wherein:

the second substrate comprises a multi-chip module, a dual-chip module, a single-chip module, or any combination thereof; and

the first substrate is an organic or a ceramic substrate containing electrical interconnects, wherein the electrical connection between the first and second substrate uses micro solder balls with a pitch of less than or equal to 500 microns.

14. The assembly of Claim 11, wherein:

the electrical signaling medium is a wirebond between the support electronic chip set and the optoelectronic transducer.

15. The assembly of Claim 11, wherein:

the first substrate includes a shelf or recess configured in the first surface to receive the optical fiber array therein in optical communication with the optoelectronic transducer.

16. A method of fabricating an optoelectronic assembly for communicating a signal from a system electronic chip set on an MCM, the system electronic chip set adapted for at least one of data processing, data switching, and data storage, to another component in a computer system, the method comprising:

etching wells configured to flushly mount an optoelectronic transducer on a first surface of a Si carrier;

wiring the support electronic chip set and the optoelectronic transducer on the combination of the ceramic carrier and the Si carrier for electrical interconnection thereof;

where the support electronic chip set is configured for at least one of providing multiplexing, demultiplexing, coding, decoding and optoelectronic transducer driving and receive functions bonding the support electronic chip set and optoelectronic transducer to the Si carrier;

interconnecting electrically the support electronic chip set to the optoelectronic transducer;

bonding a fiber array aligned with the optoelectronic transducer;

attaching the Si carrier to a ceramic carrier;

attaching the ceramic carrier to a MCM; and

aligning an optical signaling medium to the fiber array.

17. The method of Claim 16, wherein the optical signaling medium includes a make once connector having a fiber cable bundle extending therefrom.

18. The method of claim 16, wherein said etching wells on said first surface of said a Si carrier are configured to flushly mount the chip set.

19. The method of claim 16, further comprising:

filling a void area between the Si carrier and the ceramic substrate with an underfill material.

20. The method of claim 16, further comprising:

adding a Si support block on a second surface opposite the first surface of the Si carrier.